

TORNADO OF MARCH 3, 1923, NEAR ELWOOD, KANS.

A funnel-shaped cloud extending to the ground was observed on the north bank of the Missouri River, 1½ miles southwest of Elwood, Kans., at about 5:35 p. m., March 3, 1923. The tornado followed a straight course, moving east of northeast for a distance of about 4 miles. It was preceded by a light thunder shower and accompanied by heavy rain, which continued for only a few minutes. Its path in Kansas, about 2 miles in length, was mostly across alfalfa fields, 4 alfalfa barns were damaged, several smaller buildings blown down, 12 large apple trees uprooted, 1 small frame house demolished, and a semaphore, made of iron and bolted to a concrete base, located at the west end of the St. Joseph and Grand Island Railroad bridge, was blown across the railroad tracks. The estimated property damage was \$4,000. No lives were lost and no one was injured.

The tornado crossed the Missouri River just north of the bridge and the first building in its path in Missouri was a sash and door factory, which was damaged to the extent of approximately \$20,000. This was by far the heaviest single property loss. The tornado then passed over railroad yards for a distance of four blocks, causing no serious destruction, except to telephone and trolley lines, which were prostrated. After leaving the railroad yards its course for about a mile was through thickly settled business and residential districts. The tornado apparently rose and fell, as the destruction in its path was not continuous. The width of the destructive portions of the path varied from 100 to 200 feet. Fifty buildings were damaged more or less, the damage to tin and shingle roofs being especially noticeable. Few substantial buildings were seriously damaged. At the Weather Observatory, about three-fourths of a mile north of the nearest point in the path, the wind attained an extreme velocity of 60 miles an hour from the west at 5:40 p. m., and at that time the barometer reading was the lowest, 29.29 inches.¹ No one was killed and only nine persons were injured, most of the injuries being slight. The property damage in St. Joseph was estimated at \$50,000.—W. S. Belden.

DOUBLE-WALLED WATERSPOUTS.

Double-walled waterspouts, or waterspouts within waterspouts, appear to be such a rare phenomenon that it seems worth while to reprint portions of several recent accounts and to add a description of a still later occurrence reported in a letter to the Marine Division of the Weather Bureau.

On June 30, 1922, Dr. G. D. Hale Carpenter, while on the shores of Lake Victoria Nyanza, Uganda, witnessed a double-walled waterspout which he describes in *Nature*² as follows:

At daybreak on June 30 there were very lowering black clouds and every indication of an immediate heavy storm. While looking out from the tent, I suddenly saw that a waterspout was traveling obliquely toward us, and as it eventually came to within about 100 yards of the shore a very good view was obtained for about five minutes before it came to an end. * * *

¹ The barograph trace for the interval during the passage of the tornado shows a V-shaped fall in pressure with about 0.05 inch vertical drop just before the apex of the V was reached. It will be remembered that barograph records available during the passage of tornadoes invariably show a very sudden fall in pressure, amounting in extreme cases to about a third of an inch. The recovery in pressure is immediate. This feature in the St. Joseph barograph is just barely perceptible.—Editor.

² *Nature*, London, Sept. 23, 1922, p. 414.

The pedicle was extremely narrow at its lower end, and not quite straight, being sinuous in outline. It broadened out gradually into a column which went up into the low cloud; the core of this column was much less dense than the periphery, and the violent upward spiral ascent of the water could be clearly seen. * * * Surrounding the central core, but separated from it by a clear narrow space, was a sheath, the lower end of which faded away some distance above the water. The profile of this sheath was undulating, it being thicker in some places than others.

In the same issue of *Nature*, commenting on Dr. Carpenter's description, Capt. D. Brunt says:

The existence of an outer sheath, separated from the central core by a clear space, would appear to require a discontinuity of water content of the air, symmetrical about the axis of the whirl. It does not appear possible to explain it even as the effect of discontinuities of velocity with the whirl. No physical explanation of this clear space can be suggested.

Another instance of an apparent double-walled waterspout is also described in *Nature*³ by Mr. H. E. Wood, of the Union Observatory, Johannesburg, who observed one on November 11, 1922. He says:

The interesting feature of the waterspout seemed to me to be the detail of the earth-end: there was a well-marked "core" surrounded by a less dense sheath.

On September 1, 1922, Maj. W. C. Ball saw two cloud pendants at Clovelly Harbor on the southwest coast of England. The following description is taken from the *Meteorological Magazine*⁴:

Both pendants were in the form of inverted cones, which depended from the well-defined and dense black under-surface of a cloud. In the case of one pendant, the cone continued in the form of a long tail similar to the lash of a whip. This tail extended about two-thirds of the way down to the sea and was bent into a curve, so that at its lower end it was almost horizontal. The edges of the tail were quite sharp and well defined. * * * Below the lower end of the tail another portion was seen rising from the sea. "The part rising from the water was less distinct than the tail, which was very sharply defined; it appeared later and had a curious filmy appearance." * * * I judged that the spout might be about two miles from the shore, and that the part rising from the water was certainly higher than the mast of a fishing boat."

The latest account of the phenomenon in question is that furnished to the Marine Division of the Weather Bureau by the master of the Danish steamship *Hammershus*. It is quoted here practically in full:

On March 7 of this year [1923] at 11 a. m., this vessel was in latitude 3° N. and longitude 29° 30' W. on a voyage from Buenos Aires to Denmark.

It had been raining very heavy all the previous night, and was still doing so. The wind was moderate but shifty. After a heavy rain-squall it cleared up so much that we could see about a mile, but it was still raining heavy. At 11 a. m. a remarkable phenomenon was observed.

A ring of spray rising from one to three feet above the sea level and about two feet wide was passed by the vessel at a distance of about 20 fathoms from its eastern edge. The ring was about 150 feet in diameter. The spray had a rotating motion in the direction of the hands of the clock in the form of a nearly perfect circle. Now in the centre of this large ring, there was another much smaller ring with a radius of about 8 feet. This second ring also consisted of spray moving in the same direction as the outer ring. Apparently its motion was more violent and the spray also seemed to rise higher from the surface of the water.

Between the two rings the sea had the same appearance as at the outside of the outer ring; you could see the rain pouring down. Inside the inner ring the sea was quite smooth. You could not see rain pouring down and the surface seemed to be concave. This may have been an illusion, though, resulting through the spray revolving round the edge of the ring. Both rings seemed to be absolutely concentric and travelled in a due westerly (true) direction at the rate of about 10 miles an hour. * * *

—H. L.

³ *Nature*, London, Jan. 20, 1923, p. 82.

⁴ *The Meteorological Magazine*, London, Oct., 1922, page 249.